



TECHNICAL MEMORANDUM

**A world of
capabilities
delivered locally**

PIPELINE REMOVAL, SAMPLING, AND RECLAMATION

Groundhog Mine Site Completion Report Addendum

Submitted To: Freeport-McMoRan Chino Mines Company
P.O. Box 10
Bayard, New Mexico 88023 USA

Submitted By: Golder Associates Inc.
301 W. College Ave, Suite 8
Silver City, New Mexico 88061 USA

Date August 11, 2011

Project No. 103-927041

9339679



RECEIVED

2011 AUG 17 PM 2:59

SUPERFUND DIV.
REMEDIAL BRANCH
(6SF-P)



TECHNICAL MEMORANDUM

Date: August 11, 2011
Project No.: 103-927041
To: Pam Pinson
Company: Freeport-McMoRan Chino Mines Company
From: Jen Pepe, Golder Silver City
cc: Kent Johnejack, Golder Tucson
Email: Jen_Pepe@Golder.com
RE: **GROUNDHOG MINE SITE COMPLETION REPORT ADDENDUM - PIPELINE REMOVAL, SAMPLING, AND RECLAMATION**

1.0 INTRODUCTION

This Technical Memorandum (TM) describes removal of stockpile material along the pipeline corridor at the former Groundhog Mine (the Groundhog Mine site) and presents results of characterization of the excavated bedrock surfaces. The Groundhog Mine site is located within the Hanover and Whitewater Creeks Investigation Unit. Reclamation of the Groundhog Mine was largely completed by 2009 under an Interim Remedial Action (IRA) pursuant to the Administrative Order on Consent (AOC) for the Freeport-McMoRan Chino Mines Company (Chino). In 2009, Golder Associates Inc. (Golder) prepared a Completion Report detailing the removal of stockpile material, shaft closure, cover construction, and surface reclamation activities completed under the IRA.

Stockpile material was left in place along a pipeline corridor, which was operational at the time the Completion Report was submitted to the New Mexico Environment Department (NMED). Pipelines along the corridor are used by the Ivanhoe Concentrator for conveying tailing reclaim water, tailing slurry, and concentrate between the Hurley operations and the Chino Mine site. During the recent concentrator shutdown, stockpile material was removed from the corridor and the pipelines along the span were replaced. The stockpile material was hauled to the West Stockpile in accordance with the terms of Chino's Discharge Permit (DP) 526.

This TM describes removal of the stockpile material along the corridor, sampling of the bedrock surface after removal, replacement of the pipelines and fill, and reclamation of the surface. The purpose of the sampling was to document the nature of the post-removal bedrock surface, including visual characterization of the exposed geologic units and laboratory chemical analysis. Laboratory analyses included acid-base accounting (ABA), total metals analysis, and Synthetic Precipitation Leachate Procedure (SPLP). Samples were collected and analyzed according to the NMED-approved Groundhog Mine Site IRA Work Plan (Chino, 2003).

w:\projects\2010 projects\103-927041 groundhog pipeline\final\gh addendum tech memo.docx

Golder Associates Inc.
301 W. College Avenue, Suite 8
Silver City, NM 88061 USA
Tel: (575) 388-0118 Fax: (575) 388-0120 www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation



This TM is organized into the following sections and attachments:

- Section 2 states the purposes of the IRA;
- Section 3 contains the site background;
- Section 4 describes the removal and reclamation activities;
- Section 5 describes monitoring activities during the removal period, including post-removal sampling and analysis of the bedrock surface;
- Section 6 presents the conclusions;
- Section 7 contains references;
- Attachment 1 contains the field sampling logs;
- Attachment 2 contains laboratory data sheets; and
- Attachment 3 presents graphical analysis of the ABA results.

Tables summarizing the laboratory analytical results, a site figure, and photographs of removal activities follow the main text.

2.0 STATEMENT OF PURPOSE

The primary objective of the IRA was to reduce mass loading of metals and acidity from source materials to groundwater and surface water in accordance with New Mexico Water Quality Control Commission requirements under Regulation 1203. Removal of the stockpile material from the pipeline corridor effectively reduced mass loading from source materials and controls potentially poor-quality surface water discharges and groundwater seepage resulting from past mining activities at the site.

The remedial action implemented at the Groundhog Mine site is consistent with the following long-term remedial objectives:

- Preventing future releases to surface water, groundwater, and soil or sediment;
- Limiting direct exposure to waste materials;
- Achieving post-mining land use;
- Preventing erosion; and
- Ensuring physical stability and site safety.

This IRA is also consistent with the long-term strategy for closure under Permit Revision 01-1 to Permit No. GR000RE and meets objectives prescribed in the AOC agreement. Requirements under the New Mexico Mining Act and rules primarily pertain to returning the disturbed area to a post-mining beneficial use, such as wildlife habitat or grazing. Once vegetation matures on the cover material and erosion is stabilized, the area will become a self-sustaining ecosystem for wildlife habitat and/or grazing.

The IRA was conducted in three phases. The first phase included a site investigation as described in the Site Investigation Report (SIR; Golder, 2001), and construction of a seepage collection system as a

temporary measure to collect shallow groundwater. The second phase involved the development of the IRA Work Plan for removing the stockpiles (Chino, 2003). The third phase of the IRA was the excavation of the stockpiles based on the Work Plan. The removal of stockpile material along the pipeline corridor is included in the third phase.

3.0 SITE BACKGROUND

The Groundhog Mine site is approximately 1-1/2 miles northeast of Bayard, New Mexico. The site lies within a small canyon that drains into Whitewater Creek. A detailed description of hydrogeologic characteristics and historical operations of the Groundhog Mine is included in the Completion Report (Golder, 2009).

The majority of the stockpile materials at the Groundhog Mine were removed at intervals from December 2003 to August 2008, in accordance with the NMED-approved Work Plan (Chino, 2003). Stockpile material was excavated, removed, and placed on the West Stockpile near the Santa Rita Pit. Chino was authorized to relocate the Groundhog Mine stockpiles to the West Stockpile under the terms of Chino's DP-526. Material was excavated to bedrock at all stockpile locations.

Following stockpile removal, the excavated surface was characterized according to the Work Plan (Chino, 2003). The site was then reclaimed with a vegetated soil cover, shafts associated with the Groundhog Mine were closed, and stormwater control was established. The stockpile material in the pipeline corridor was left in place adjacent to the haul road due to the presence of buried pipes used by the concentrator operations. Minimal stockpile material was also left in place underneath the telemetry station at the south end of the site and remains capped with soil growth medium.

4.0 STOCKPILE MATERIAL REMOVAL

Potentially acidic stockpile material delineated in the SIR (Golder, 2001) was removed from the pipeline corridor from December 2010 to February 2011 (Figure 1). Chino excavated the stockpile materials to bedrock and scraped the bedrock surface to remove weathered surfaces to the extent possible. Photographs of construction activities are included with this TM.

Approximately 42,500 cubic yards of excavated material was hauled to the northwest side of the West Stockpile, which is authorized under DP-526. Clean fill for the new pipeline bedding was obtained from the south end of the local borrow area that has been used for fill and cover during previous closure activities (Golder, 2009).

The pipelines buried in the corridor were dismantled during excavation activities, and re-used or removed from site. Following excavation of stockpile material and placement of clean fill along the corridor, Chino installed three pipelines at the surface with protective berms on either side. The three replaced pipelines included the concentrate, east train tailing slurry line, and the process water pipeline.

Surface reclamation and surface-water controls were established consistent with the overall site objectives, as detailed in the IRA and Completion Report (Chino, 2003 and Golder, 2009). Reclamation of the surface included placing a minimum of 1 foot of soil on the exposed bedrock surface as a growth medium for vegetation. The loose cover was scarified after placement to enhance seed germination. The soil cover was obtained from the local borrow area. Native seeds and mulch were spread on the soil cover with a hydroseeder consistent with DP-1340 and New Mexico Mining and Minerals Division closeout permit requirements.

The pipeline corridor separated the upper and lower stormwater ponds (Figure 1). Prior to the pipeline removal, both stormwater ponds were pumped to Reservoir 17. The upper stormwater pond was pumped dry after storm events to minimize seepage through the impacted pipeline-corridor material. During the pipeline removal, a 28-inch high-density polyethylene culvert pipe was installed under the pipeline corridor and haul road and fill was added to the pond depression to prevent water from ponding against the corridor fill. All stormwater flow through the site now drains to the lower stormwater pond, which is still pumped to Reservoir 17.

5.0 CONSTRUCTION-PERIOD MONITORING AND POST-REMOVAL SAMPLING

The engineering oversight and environmental monitoring performed during removal and reclamation activities are described in the following sections. The long-term monitoring plan for the Groundhog Mine site was presented in the Completion Report (Golder, 2009).

5.1 Air Monitoring

Construction monitoring included visual air and seepage monitoring. Dust suppression was conducted during excavation activities by wetting roads and work areas on an as-needed basis. Dust suppression was needed primarily for haul truck activities, as the stockpile material from the pipeline corridor was usually moist.

5.2 Oversight of Removal and Reclamation Activities

The scope of the engineering oversight included supervising the excavation/reclamation process to ensure that the IRA and post-removal sampling met the guidelines of the Work Plan (Chino, 2003). Chino provided oversight of stockpile removal activities, pipeline removal and re-installation, and reclamation activities. Post-removal sampling was performed jointly by Chino and Golder, with oversight by NMED, as described in Section 5.3.

5.3 Post-Removal Sampling

Post-removal sampling was completed on February 16, 2011, by representatives of Chino, NMED, and Golder. The exposed weathered bedrock surface was mapped by a Chino geologist. The surface was inspected and described using general geologic descriptions of each surficial geologic unit present within

the excavation footprint. The surficial geologic units were described in a field notebook and sketched on a field map. Any other identifying characteristics, such as staining, fracturing, nature of geologic contacts, etc., were also noted.

A geologic map of the excavation footprint is shown on Figure 1, which includes mapping data carried over from the Completion Report (Golder, 2009). Geologic units encountered along the former pipeline corridor included:

- Biotized granodiorite (Tgr) – weakly biotized or phyllically altered with clay overprint with orthoclase (potassium alteration). Also had light orange iron-oxide stains on fractured surfaces.
- Quartz monzonite (Tqm) – a light green porphyry dike intruding fault structures with no alteration from mineralization emplacement. Thin tan soil derived from Kneeling Nun Tuff covering on bedrock surface.
- Limestone (Pos) – fine-grained to micritic crystalline, light grey, soft limestone. Traces of orange, impacted clasts.
- Alluvium (Qal) – hard, dark clay developed from erosion of Kneeling Nun tuff, top layer (to 2 feet deep) has orange stains in fractures.

Stratified sampling was performed by Golder to include each geologic unit encountered on the exposed bedrock surface in the pipeline corridor area. A total of six samples were collected at the locations shown on Figure 1. Each sample location was photographed. Sampling logs including photographs and geologic descriptions are included in Attachment 1.

One sample was collected from the limestone (PC-Poswaldo-3) and the alluvium (PC-Qal-4). Two samples each of the biotized granodiorite (PC-Tgr-5 and PC-Tgr-6) and the quartz monzonite (PC-Tqm-1 and PC-Tqm-2) were collected. Each sample was analyzed separately for paste pH according to the Work Plan (Chino, 2003). The two samples of the quartz monzonite were similar in texture and mineralization and were composited for laboratory analysis (PC-Tqm-1 and -2 Composite). All other samples were analyzed separately for all analytical suites. The two granodiorite samples were not composited due to the difference in texture. Sample PC-Tgr-5 was weathered to clay, and sample PC-Tgr-6 was a hard rock outcrop. One blind field duplicate was also collected from location PC-Tgr-5.

5.4 Laboratory Analysis

All samples were shipped to SVL Analytical, Inc. (SVL) in Kellogg, Idaho. SVL performed the following analyses:

- Paste pH: ASA 9
- ABA: Modified Sobek
- SPLP: Method 1312
- Total Metals: SW-846 Method 3050

The Work Plan also included X-Ray Fluorescence (XRF) analysis for all individual samples to investigate the variability of metals concentrations within each geologic unit (Chino, 2003). This analysis was not performed for the pipeline corridor samples, as previous analyses indicated that variability within each unit was not significant and composite samples could be used to characterize the general nature of the bedrock surfaces. NMED concurred with this approach.

Each sample was analyzed separately for paste pH. The two samples of the quartz monzonite were similar in texture and mineralization and were composited for ABA, total metals analysis, and SPLP testing. All other samples were analyzed separately for all analytical testing.

Samples were air dried and crushed by SVL to 3/8-inch according to SPLP Method 1312. A sub-sample was then pulverized to -160 mesh (approximately 0.09 millimeters) for ABA and total metals analysis. The samples were not sieved prior to crushing.

Total metals analysis included aluminum, cadmium, cobalt, copper, iron, manganese, lead, and zinc. SPLP was conducted for each of these metals plus fluoride, total dissolved solids, and sulfate.

5.5 Analytical Results

Analytical results are summarized in Tables 1 through 3, and discussed below. Laboratory data sheets are in Attachment 2.

5.5.1 Acid-Base Accounting

ABA results are presented in Table 1. Attachment 3 provides graphical analyses of the pertinent results. In accordance with Price (1997), the following screening criteria were used to classify samples in terms of their acid-generation potential:

Acid Rock Drainage (ARD) Potential	Screening Criterion	Comments
Likely	$ANP/AGP < 1$	Likely ARD generating unless sulfide minerals are non-reactive
Possibly	$1 < ANP/AGP < 2$	Possibly ARD generating if ANP is insufficiently reactive or is depleted at a rate faster than sulfides
Low	$2 < ANP/AGP < 4$	Not potentially ARD generating unless sulfides are preferentially exposed or extremely reactive in combination with insufficiently reactive ANP
None	$ANP/AGP > 4$	Not acid generating

Notes:

ANP = acid-neutralization potential
AGP = acid-generation potential
ARD = acid-rock drainage

A fifth category follows an empirical rule of thumb: materials with sulfide sulfur contents less than 0.3 percent and a paste pH greater than 5.5 are generally considered not acid-generating, regardless of their ratio of acid-neutralization potential (ANP) to acid-generation potential (AGP).

The stockpile material classifications based on Price (1997) are included in Table 1. Based on ANP/AGP ratios alone, of the five samples, two were classified as likely to generate acid, three are not acid generating, and one is not classifiable because ANP and AGP were not detected at concentrations greater than the analytical method limit. Figure 3-1 in Attachment 3 shows ANP values versus AGP values. Also included are the linear expressions of the acid-rock drainage criteria advocated by Price (1997). Figure 3-2 graphically relates pyritic sulfur content to the paste pH results. Samples in the upper left quadrant of Figure 3-2 are considered to not be acid generating.

Sample PC-Tqm-1 and -2 Composite, the quartz monzonite composite, is classified as likely to generate acid. Visible pyrite and jarosite were identified in this sample during field logging, as verified by the high sulfide sulfur content (1.04 percent). Paste pH values for the individual samples and the composite sample are circum-neutral. This area of the bedrock surface appears to be both mineralized and impacted by residual acidity from past reactivity of the overlying stockpile materials.

Sample PC-Poswado-3, collected from a limestone outcrop, also has high sulfide sulfur content (3.71 percent). However, the sample is classified as not acid generating due to its high ANP value and paste pH of 7.67 standard units (s.u). This is typical of the mineralized limestone found in waste rock from the area during the site characterization (Golder, 2001). Sample PC-Qal-4, collected from a hardpan clay alluvial deposit on the granodiorite surface, is classified as not acid generating, has a paste pH of 6.34 s.u., and is low in sulfide sulfur (0.03 percent).

The two samples from biotized granodiorite, PC-Tgr-5 and PC-Tgr-6, are classified as likely to generate acid and not acid generating, respectively, based on Price (1997). Both samples have low paste pH values (less than 4 s.u.). It should be noted that for both of these samples, sulfide sulfur content is low (0.03 percent or less). In fact, the sulfide sulfur content is so low that acid generation through oxidation is considered unlikely. The low values for paste pH likely reflect past reactivity, which may have resulted in formation of oxidation products, such as jarosites, that contain stored acidity, which is released when they dissolve.

Additional graphical analysis of ABA, presented in Figures 3-3 through 3-6, includes plots of pyrite sulfur versus total sulfur, sulfate sulfur versus total sulfur, paste pH versus NP, and paste pH versus the ANP/AGP ratio, respectively.

5.5.2 Total Metals and SPLP Results

Total metals analysis and SPLP results are listed in Tables 2 and 3, respectively. Total metals analysis was conducted to determine the nature of the excavated bedrock surface prior to cover material placement. SPLP testing was performed to determine whether metal concentrations, identified by total metals analysis, have the potential to leach from the stockpile material.

Good agreement was observed between leachate pH and paste pH, in that values were either consistently alkaline/neutral or acidic. Results are generally consistent with samples collected east of the haul road during previous characterization of the bedrock surfaces (Golder, 2009), showing elevated concentrations of total and leachable cadmium, copper, manganese, lead, and zinc. The sample of limestone, PC-Poswaldo-3, had elevated concentrations of these total metals, but lower concentrations of leachable metals.

6.0 CONCLUSIONS

This TM is an addendum to the Completion Report for removing the remaining stockpile material adjacent to the pipeline corridor, sampling of the bedrock surface, and surface reclamation. Stockpile material was excavated to bedrock, removed, and placed on the West Stockpile. Chino was authorized to relocate the Groundhog Mine site stockpiles to the West Stockpile under the terms of Chino's DP-526.

Following stockpile removal, the excavated surface was characterized according to the Work Plan (Chino, 2003) and consistent with the previous sampling reported in detail in the Completion Report (Golder, 2009). The site was reclaimed with a seeded soil cover, and a culvert was installed to allow drainage of the upper stormwater pond to the lower stormwater pond.

Results of characterization of the bedrock surface indicate that elevated concentrations of some metals in the bedrock surface are associated with naturally occurring mineralization; however, some residual acidity and metal concentrations may be present due to leaching from the stockpile material prior to removal.

Surface water will continue to be contained on-site and pumped to Reservoir 17 until samples meet water-quality standards as prescribed in the Completion Report, or when concentrations of monitored constituents have stabilized to local background conditions. The post-reclamation monitoring plan is included in the Completion Report (Golder, 2009).

7.0 REFERENCES

- Chino Mines Company, 2003. *Administrative Order on Consent, Interim Remedial Action, Groundhog Mine Stockpile, Interim Remedial Action Work Plan, Hanover and Whitewater Creeks Investigation Unit*. October 23, 2003.
- Golder Associates Inc. (Golder), 2001. *Interim Remedial Action, Groundhog Mine Stockpile, Site Investigation Report*. Prepared for Chino Mines Company, July 20, 2001.

Golder, 2009. *Completion Report, Interim Remedial Action, Groundhog Stockpile, Hanover and Whitewater Creeks Investigation Unit*. Prepared for Freeport McMoRan Chino Mines Company. June 10, 2009.

Price, William A, 1997. Draft, *Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia*. Reclamation Section, Energy and Minerals Division, Ministry of Employment and Investment, British Columbia. April 1997.

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

**Golder Associates Inc.
301 W. College Ave, Suite 8
Silver City, New Mexico 88061 USA
Tel: (575) 388-0118**



TABLES

Table 1: Acid-base accounting results, February 16, 2011

Sample ID	Paste pH	ABA Results				Sulfur				Material Classification
		Net Neutralizing Potential	ANP/AGP	AGP	ANP	Unidentifiable	Sulfide	Sulfate	Total	
	s.u.	tCaCO ₃ /kt		tCaCO ₃ /kt	tCaCO ₃ /kt	%	%	%	%	
PC-Tqm-1	7.17	NA	NA	NA	NA	NA	NA	NA	NA	
PC-Tqm-2	6.29	NA	NA	NA	NA	NA	NA	NA	NA	
PC-Tqm-1 and 2 Composite	6.71	-9.6	0.7	32.6	23	0.06	1.04	0.76	1.86	Likely to Generate Acid
PC-Poswaldo-3	7.67	499	5.3	116	615	0.17	3.71	1.16	5.04	Not Acid Generating
PC-Qal-4	6.34	5.5	7.2	0.9	6.5	< 0.01	0.03	0.08	0.11	Not Acid Generating
PC-Tgr-5	3.76	-0.7	<0.4	0.7	< 0.3	< 0.01	0.02	0.68	0.71	Likely to Generate Acid
PC-Tgr-6	3.97	5.1	18.0	0.3	5.4	< 0.01	0.01	0.13	0.14	Not Acid Generating

Notes: TCaCO₃/kt = Tons of calcium carbonate per kiloton
 AGP = Acid-generating potential
 ANP = Acid-neutralizing potential
 s.u. = Standard pH units
 < = analyte was not detected above the analytical method limit

August 2011

103-927041

Table 2: Total metals results, sampled on February 16, 2011

Sample Name	Aluminum (mg/kg)	Cadmium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)
PC-Tqm-1 and -2 Composite	11,800	44.3	18.4	989	36,600	1,560	3,930	12,000
PC-Poswaldo-3	7,140	480	6.57	2,240	23,900	11,400	2,530	163,000
PC-Qal-4	26,700	5.08	23.3	142	21,200	146	1,890	1,650
PC-Tgr-5	32,000	3.94	8.46	664	31,600	552	3,150	3,470
PC-Tgr-6	19,200	1.14	10.2	408	26,100	635	3,240	1,520

Note: mg/kg = milligrams per kilogram

August 2011

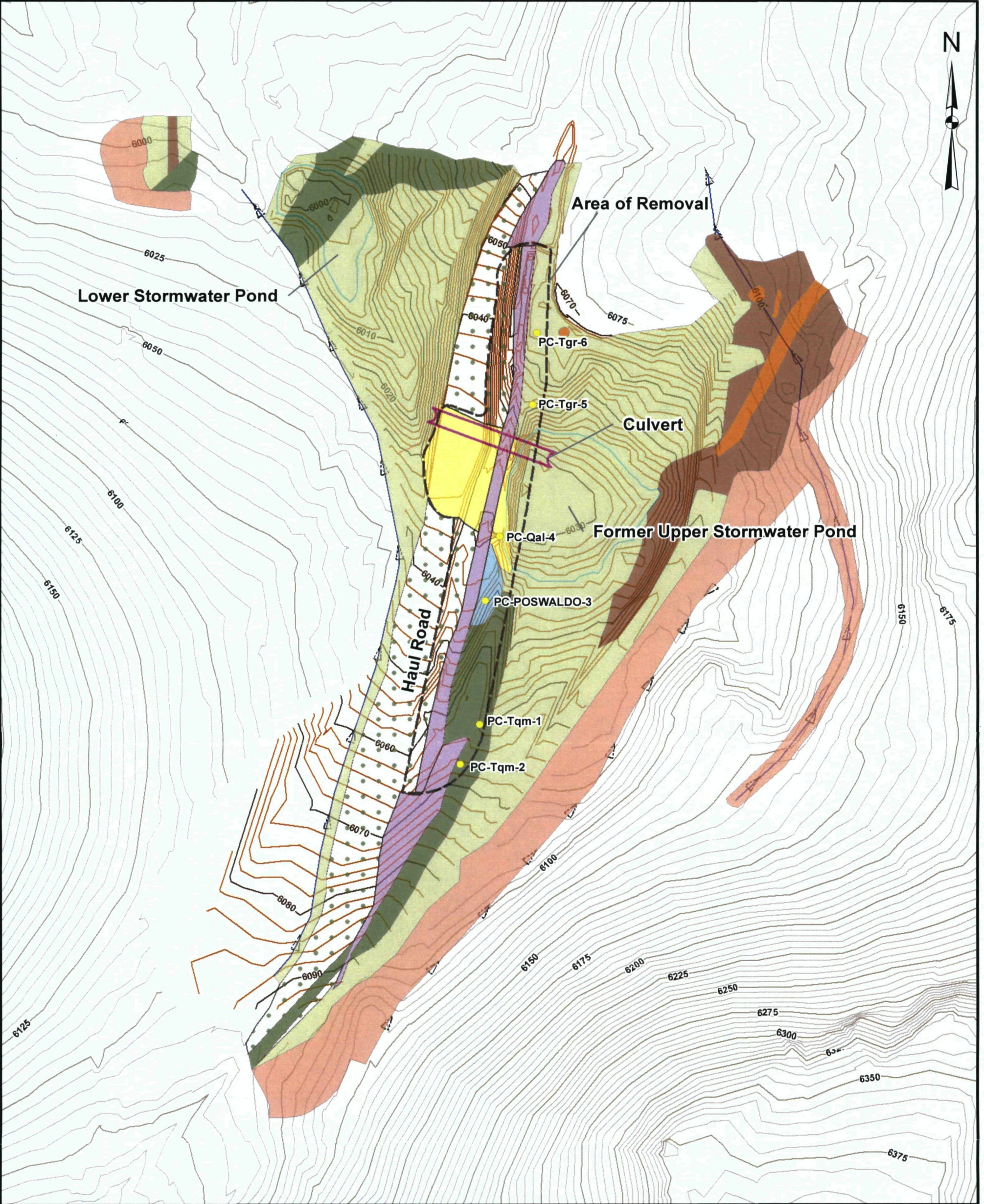
103-927041

Table 3: Synthetic precipitation leaching procedure results, sampled on February 16, 2011

Sample Name	pH (s.u.)	Aluminum (mg/L E)	Cadmium (mg/L E)	Cobalt (mg/L E)	Copper (mg/L E)	Fluoride (mg/L E)	Iron (mg/L E)	Lead (mg/L E)	Manganese (mg/L E)	Zinc (mg/L E)	Sulfate, SO4 (mg/L E)	TDS (mg/L E)
PC-Tqm-1 and -2 Composite	7.56	< 0.08	0.018	< 0.006	< 0.01	1.8	< 0.06	< 0.0075	1.05	0.59	464	709
PC-Poswaldo-3	7.7	< 0.08	0.003	< 0.006	< 0.01	0.681	< 0.06	0.0403	0.26	1.2	1460	2280
PC-Qal-4	7.43	< 0.08	0.017	0.01	< 0.01	0.604	< 0.06	< 0.0075	3.79	4.93	90.7	154
PC-Tgr-5	4.35	24	0.157	0.18	12.3	1.39	< 0.06	0.267	45.9	89.3	1170	1330
PC-Tgr-6	4.86	0.6	0.02	0.03	3.97	0.263	< 0.06	0.0247	4.46	9.27	111	153

Notes: TDS = Total dissolved solids
s.u. = Standard pH units
mg/L E = milligrams per liter extract
< = Analyte not detected above the analytical method limit

FIGURE

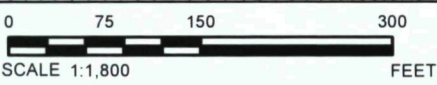



LEGEND

- Post - Removal Sample Point
- ▭ Culvert
- ▭ Area of Removal
- ▭ Pipeline Corridor
- ▭ Tgr - Biotized Granodiorite
- ▭ Tgr - Jasperoid Vein - Mineralized and Leach Cap Altered Granodiorite
- ▭ Tgr - Phyllically Altered Granodiorite
- ▭ Tgr - Projected Granodiorite - Haul Road
- ▭ Tkn - Kneeling Nun Tuff or Sugar Lump Tuff
- ▭ Tqm - Quartz Monzonite
- ▭ Pos - Fine Grained Crystalline Light Gray Limestone
- ▭ Qal - Clay with Minor Soil Developed from Erosion of Tkn

REFERENCES

Projection: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet



PROJECT Freeport-McMoRan Chino Mines Company Pipeline Fill Removal Grant County, NM	
TITLE Groundhog Mine Site Post - Removal Sampling of Pipeline Corridor	
 Golder Associates Tucson, Arizona	PROJECT No. 103-92704 FIGURE 1

PHOTOGRAPHS



Project Title: Groundhog Mine Site Pipeline Removal, Sampling, and Reclamation

PHOTO 1

Groundhog Mine site prior to removing stockpile material and replacing pipelines

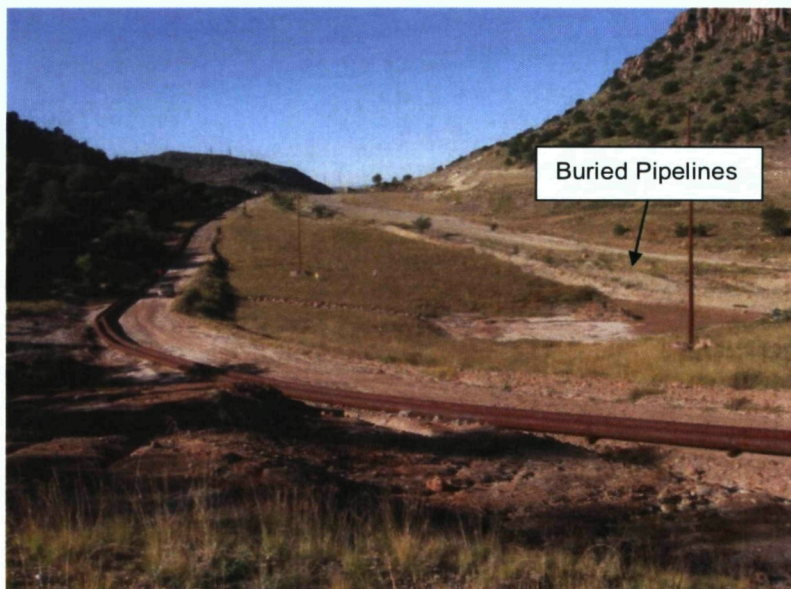


PHOTO 2

Excavation of stockpile materials in January 2011, looking north





PHOTO 3

Excavation of stockpile materials in January 2011, looking south



PHOTO 4

Completion of removal activities and placement of new pipeline corridor bedding material, February 2011





PHOTO 5

Bedrock surface area
sampled, February 2011,
looking south



PHOTO 6

New culvert outlet to lower
stormwater pond





PHOTO 7

Installation of new pipeline,
March 2011



PHOTO 8

Overview showing new
pipeline corridor



ATTACHMENT 1
LITHOLOGIC LOGS



SAMPLE LOG: PC-Tqm-1

Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post-removal sampling
Project No.: 103-9270401

Location: Groundhog Mine
UTM NAD 83 Easting (m): 770986
UTM NAD 83 Northing (m): 3630042

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
2	1 1/2	Quartz Monzonite	Quartz monzonite - green porphyry-outcrop with no alteration. Tan soil covering volcanic soil from the Kneeling Nun Tuff formation.	1" to 5" clasts from the quartz monzonite formation. Sandy volcanic soil.





SAMPLE LOG: PC-Tqm-2

Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post--removal sampling
Project No.: 103-9270401

Location: Groundhog Mine
UTM NAD 83 Easting (m): 770977
UTM NAD 83 Northing (m): 3630022

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
2	1 1/2	Quartz Monzonite	Quartz Monzonite - green porphyry-outcrop with no alterations. Tan soil covering volcanic soil from the Kneeling Nun Tuff formation. Pink potassium feldspar. Trace Pyrite. Quartz Monzonite has jarosite coating.	Sandy soil with clay.





SAMPLE LOG: PC-POSWALDO-3

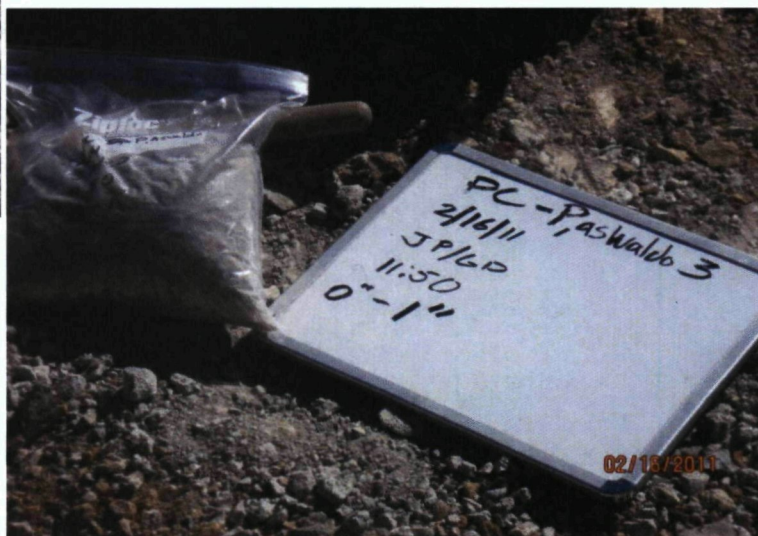
Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post-removal sampling
Project No.: 103-9270401

Location: Groundhog Mine
UTM NAD 83 Easting (m): 770987
UTM NAD 83 Northing (m): 3630103

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
1 - 2	2	Limestone	Soft limestone - micritic, calcite rich. Trace orange impacted clasts.	Outcrops with fines.





SAMPLE LOG: PC-Qal-4

Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post-removal sampling
Project No.: 103-9270401

Location: Groundhog Mine
UTM NAD 83 Easting (m): 770993
UTM NAD 83 Northing (m): 3630135

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
3	1/4	Alluvium	Clay from Kneeling Nun tuff. Light brown/tan. Hard dark clay. Top clay layer (0-2") has orange stains in fractures.	Sand and fines with 50% hard clay





SAMPLE LOG: PC-Tgr-5

Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post--removal sampling
Project No.: 103-9270401

Location: Groundhog Mine
UTM NAD 83 Easting (m): 771007
UTM NAD 83 Northing (m): 3630200

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
3"	1/4	Orange-red clay cap on Granodiorite	Clay contains stockpile impact. Outcrop deeply clay altered with precipitate. Red clay on white clay granodiorite.	Weathered clay on bedrock outcrop





SAMPLE LOG: PC-Tgr-6

Date: 2/16/2011

Client: Freeport McMoRan
Project: GH post--removal sampling
Project No.: 103-92704

Location: Groundhog Mine
UTM NAD 83 Easting (m): 771008
UTM NAD 83 Northing (m): 3630235

Lithology:

Depth (in.)	Area (sf)	Geologic Unit	Mineralogical Description	Textural Description
0-1"	2	Biotized Granodiorite	Weakly biotized granodiorite with trace clay overprint with orthoclase (potassium-alteration). Light orange iron oxide stain on fractured surfaces.	Hardrock outcrop.



ATTACHMENT 2
LABORATORY ANALYTICAL RESULTS

Table 2-1: Comparison of PC-Tgr-5 and Duplicate Sample Analytical Results, Samples February 16, 2011**Acid-base accounting results**

Sample ID	Paste pH ⁺	ABA Results				Sulfur			
		Net Neutralizing Potential	ANP/AGP	AGP	ANP	Unidentifiable	Sulfide	Sulfate	Total
	s.u.	tCaCO ₃ /kt		tCaCO ₃ /kt	tCaCO ₃ /kt	%	%	%	%
PC-Tgr-5	3.76	-0.7	<0.4	0.7	< 0.3	< 0.01	0.02	0.68	0.71
PC-Tgr-DUP	3.69	< 0.3	—	< 0.3	< 0.3	< 0.01	< 0.01	0.59	0.59

Total metals results

Sample Name	Aluminum (mg/kg)	Cadmium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Zinc (mg/kg)
PC-Tgr-5	32,000	3.94	8.46	664	31,600	552	3,150	3,470
PC-Tgr-DUP	29,900	2.88	8.41	520	28,700	242	3,480	2,630

Synthetic precipitation leaching procedure results

Sample Name	pH (s.u.)	Aluminum (mg/L E)	Cadmium (mg/L E)	Cobalt (mg/L E)	Copper (mg/L E)	Fluoride (mg/L E)	Iron (mg/L E)	Lead (mg/L E)	Manganese (mg/L E)	Zinc (mg/L E)	Sulfate, SO ₄ (mg/L E)	TDS (mg/L E)
PC-Tgr-5	4.35	24	0.157	0.18	12.3	1.39	< 0.06	0.267	45.9	89.3	1170	1330
PC-Tgr-DUP	4.03	20.5	0.118	0.14	9.69	1.14	0.06	0.0501	35.1	60.4	671	960

Notes: TDS = Total dissolved solids
 mg/L E = milligrams per liter extract
 TCaCO₃/kT = Tons of calcium carbonate per kiloton
 AGP = Acid-generating potential
 ANP = Acid-neutralizing potential
 s.u. = Standard pH units
 < = analyte was not detected above the analytical method limit
 mg/kg = milligrams per kilogram



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
PC-Tqm-1	W1B0343-01	Soil	16-Feb-11 11:15	JP	18-Feb-2011
PC-Tqm-2	W1B0343-02	Soil	16-Feb-11 11:40	JP	18-Feb-2011
PC-Tqm-1 AND 2 COMPOSITE	W1B0343-03	Soil	16-Feb-11 00:00	JP	18-Feb-2011
PC-POSWALDO-3	W1B0343-04	Soil	16-Feb-11 11:50	JP	18-Feb-2011
PC-Qal-4	W1B0343-05	Soil	16-Feb-11 12:15	JP	18-Feb-2011

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Sample preparation is defined by the client as per their Data Quality Objectives.

This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.

The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

(Q6) SVL received the following containers outside of published EPA guidelines for preservation temperatures (0-6°C).

The guidelines do not pertain to nitric-preserved metals.

Default Cooler (Received Temperature: 7.4°C)

Labnumber	Container	Client ID	Labnumber	Container	Client ID
W1B0343-01 A	Bag, Ziploc	PC-Tqm-1	W1B0343-01 B	Manilla Pulverize	PC-Tqm-1
W1B0343-02 A	Bag, Ziploc	PC-Tqm-2	W1B0343-02 B	Manilla Pulverize	PC-Tqm-2
W1B0343-03 A	Manilla Pulverize	PC-Tqm-1 AND 2 COMPOSITE	W1B0343-04 A	Bag, Ziploc	PC-POSWALDO-3
W1B0343-04 B	Manilla Pulverize	PC-POSWALDO-3	W1B0343-05 A	Bag, Ziploc	PC-Qal-4
W1B0343-05 B	Manilla Pulverize	PC-Qal-4			



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Client Sample ID: **PC-Tqm-1**SVL Sample ID: **W1B0343-01 (Soil)****Sample Report Page 1 of 1**

Sampled: 16-Feb-11 11:15
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Classical Chemistry Parameters

ASA 9	Paste pH @20.0°C	7.17	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Client Sample ID: **PC-Tqm-2**SVL Sample ID: **W1B0343-02 (Soil)**

Sample Report Page 1 of 1

Sampled: 16-Feb-11 11:40
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Classical Chemistry Parameters

ASA 9	Paste pH @19.9°C	6.29	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: **W1B0343**
Reported: 04-Mar-11 08:47

Client Sample ID: **PC-Tqm-1 AND 2 COMPOSITE**SVL Sample ID: **W1B0343-03 (Soil)**

Sample Report Page 1 of 1

Sampled: 16-Feb-11 00:00
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	11800	mg/kg	8.0	2.0		W109096	AS	03/03/11 10:42	
EPA 6010B	Cadmium	44.3	mg/kg	0.20	0.03		W109096	AS	03/03/11 10:43	
EPA 6010B	Cobalt	18.4	mg/kg	0.60	0.06		W109096	AS	03/03/11 10:44	
EPA 6010B	Copper	989	mg/kg	1.00	0.21		W109096	AS	03/03/11 10:43	
EPA 6010B	Iron	36600	mg/kg	6.0	1.5		W109096	AS	03/03/11 10:42	
EPA 6010B	Lead	1560	mg/kg	0.75	0.36		W109096	AS	03/03/11 10:43	
EPA 6010B	Manganese	3930	mg/kg	0.40	0.09		W109096	AS	03/03/11 10:42	
EPA 6010B	Zinc	12000	mg/kg	10.0	1.40	10	W109096	DG	03/03/11 14:54	D2

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	-9.6	TCaCO3/kT	0.3			N/A		02/25/11 14:34	
Modified Sobek	AGP	32.6	TCaCO3/kT	0.3			N/A		02/24/11 15:52	
Modified Sobek	ANP	23.0	TCaCO3/kT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	0.06	%	0.01			W109181	HJG	02/24/11 15:52	
Modified Sobek	Non-Sulfate Sulfur	1.10	%	0.01			W109181	HJG	02/24/11 14:49	
Modified Sobek	Pyritic Sulfur	1.04	%	0.01			N/A		02/24/11 15:52	
Modified Sobek	Sulfate Sulfur	0.76	%	0.01			N/A		02/24/11 14:49	
Modified Sobek	Total Sulfur	1.86	%	0.01			W109181	HJG	02/23/11 14:15	

Classical Chemistry Parameters

ASA 9	Paste pH @19.6°C	6.71	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	93.5	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	7.37	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	< 0.08	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 17:25	
EPA 6010B	Cadmium	0.018	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 17:26	
EPA 6010B	Cobalt	< 0.006	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 17:26	
EPA 6010B	Copper	< 0.01	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 17:26	
EPA 6010B	Iron	< 0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 17:25	
EPA 6010B	Lead	< 0.0075	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 17:26	
EPA 6010B	Manganese	1.05	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 17:24	
EPA 6010B	Zinc	0.59	mg/L Extract	0.01	0.002		W109280	AS	03/01/11 17:26	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	709	mg/L Extract	10.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.9°C	7.56	pH Units				W109250	DKS	02/24/11 12:05	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	1.80	mg/L Extract	0.100	0.034		W109244	FEH	03/01/11 19:02	
EPA 300.0	Sulfate as SO4	464	mg/L Extract	7.50	1.32	25	W109244	FEH	03/01/11 19:14	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Client Sample ID: PC-POSWALDO-3

SVL Sample ID: W1B0343-04 (Soil)

Sample Report Page 1 of 1

Sampled: 16-Feb-11 11:50
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	7140	mg/kg	8.0	2.0		W109096	AS	03/03/11 11:01	
EPA 6010B	Cadmium	480	mg/kg	0.20	0.03		W109096	AS	03/03/11 11:03	
EPA 6010B	Cobalt	6.57	mg/kg	0.60	0.06		W109096	AS	03/03/11 11:03	
EPA 6010B	Copper	2240	mg/kg	1.00	0.21		W109096	AS	03/03/11 11:03	
EPA 6010B	Iron	23900	mg/kg	6.0	1.5		W109096	AS	03/03/11 11:01	
EPA 6010B	Lead	11400	mg/kg	75.0	36.0	100	W109096	DG	03/03/11 15:11	D2
EPA 6010B	Manganese	2530	mg/kg	0.40	0.09		W109096	AS	03/03/11 11:01	
EPA 6010B	Zinc	163000	mg/kg	100	14.0	100	W109096	DG	03/03/11 15:11	D2

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	499	TCaCO3/kT	0.6		2	N/A		02/25/11 14:34	
Modified Sobek	AGP	116	TCaCO3/kT	0.6		2	N/A		02/24/11 15:55	
Modified Sobek	ANP	615	TCaCO3/kT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	0.17	%	0.01			W109181	HJG	02/24/11 15:55	
Modified Sobek	Non-Sulfate Sulfur	3.88	%	0.01		2	W109181	HJG	02/24/11 14:56	D2
Modified Sobek	Pyritic Sulfur	3.71	%	0.01		2	N/A		02/24/11 15:55	
Modified Sobek	Sulfate Sulfur	1.16	%	0.01		2	N/A		02/24/11 14:56	
Modified Sobek	Total Sulfur	5.04	%	0.01		2	W109181	HJG	02/23/11 15:11	D2

Classical Chemistry Parameters

ASA 9	Paste pH @19.7°C	7.67	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	97.4	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	7.85	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	< 0.08	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 17:42	
EPA 6010B	Cadmium	0.003	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 17:43	
EPA 6010B	Cobalt	< 0.006	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 17:43	
EPA 6010B	Copper	< 0.01	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 17:43	
EPA 6010B	Iron	< 0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 17:42	
EPA 6010B	Lead	0.0403	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 17:43	
EPA 6010B	Manganese	0.26	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 17:42	
EPA 6010B	Zinc	1.20	mg/L Extract	0.01	0.002		W109280	AS	03/01/11 17:43	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	2280	mg/L Extract	40.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.8°C	7.70	pH Units				W109250	DKS	02/24/11 12:06	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	0.681	mg/L Extract	0.500	0.170	5	W109244	FEH	03/01/11 19:26	D2
EPA 300.0	Sulfate as SO4	1460	mg/L Extract	15.0	2.65	50	W109244	FEH	03/01/11 19:38	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Client Sample ID: PC-Qal-4

SVL Sample ID: W1B0343-05 (Soil)

Sample Report Page 1 of 1

Sampled: 16-Feb-11 12:15
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	26700	mg/kg	8.0	2.0		W109096	AS	03/03/11 11:07	
EPA 6010B	Cadmium	5.08	mg/kg	0.20	0.03		W109096	AS	03/03/11 11:09	
EPA 6010B	Cobalt	23.3	mg/kg	0.60	0.06		W109096	AS	03/03/11 11:09	
EPA 6010B	Copper	142	mg/kg	1.00	0.21		W109096	AS	03/03/11 11:09	
EPA 6010B	Iron	21200	mg/kg	6.0	1.5		W109096	AS	03/03/11 11:07	
EPA 6010B	Lead	146	mg/kg	0.75	0.36		W109096	AS	03/03/11 11:09	
EPA 6010B	Manganese	1890	mg/kg	0.40	0.09		W109096	AS	03/03/11 11:07	
EPA 6010B	Zinc	1650	mg/kg	1.00	0.14		W109096	DG	03/03/11 15:16	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	5.5	TCaCO ₃ /kT	0.3			N/A		02/25/11 14:34	
Modified Sobek	AGP	0.9	TCaCO ₃ /kT	0.3			N/A		02/24/11 15:58	
Modified Sobek	ANP	6.5	TCaCO ₃ /kT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01			W109181	HJG	02/24/11 15:58	
Modified Sobek	Non-Sulfate Sulfur	0.03	%	0.01			W109181	HJG	02/24/11 14:59	
Modified Sobek	Pyritic Sulfur	0.03	%	0.01			N/A		02/24/11 15:58	
Modified Sobek	Sulfate Sulfur	0.08	%	0.01			N/A		02/24/11 14:59	
Modified Sobek	Total Sulfur	0.11	%	0.01			W109181	HJG	02/23/11 14:23	

Classical Chemistry Parameters

ASA 9	Paste pH @19.8°C	6.34	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	89.1	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	7.42	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	< 0.08	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 17:48	
EPA 6010B	Cadmium	0.017	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 17:49	
EPA 6010B	Cobalt	0.01	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 17:49	
EPA 6010B	Copper	< 0.01	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 17:49	
EPA 6010B	Iron	< 0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 17:48	
EPA 6010B	Lead	< 0.0075	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 17:49	
EPA 6010B	Manganese	3.79	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 17:47	
EPA 6010B	Zinc	4.93	mg/L Extract	0.01	0.002		W109280	AS	03/01/11 17:49	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	154	mg/L Extract	10.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.8°C	7.43	pH Units				W109250	DKS	02/24/11 12:08	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	0.604	mg/L Extract	0.100	0.034		W109244	FEH	03/01/11 19:50	
EPA 300.0	Sulfate as SO ₄	90.7	mg/L Extract	1.50	0.26	5	W109244	FEH	03/01/11 20:02	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
--------	---------	-------	--------	-----	-----	----------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	mg/kg	<8.0	2.0	8.0	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	<0.20	0.03	0.20	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	<0.60	0.06	0.60	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W109096	03-Mar-11	B7
EPA 6010B	Iron	mg/kg	<6.0	1.5	6.0	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	<0.75	0.36	0.75	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	<0.40	0.09	0.40	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	<1.00	0.14	1.00	W109096	03-Mar-11	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ANP	TCaCO ₃ /kT	<0.3	0.01	0.3	W109181	25-Feb-11	
Modified Sobek	Non-Sulfate Sulfur	%	<0.01		0.01	W109181	24-Feb-11	
Modified Sobek	Total Sulfur	%	<0.01		0.01	W109181	23-Feb-11	
Modified Sobek	Non-extractable Sulfur	%	<0.01		0.01	W109181	24-Feb-11	

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	pH Units	5.00			W109037	23-Feb-11	
-------------	----------------	----------	------	--	--	---------	-----------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	mg/L Extract	<0.08	0.02	0.08	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	<0.002	0.0005	0.002	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	<0.006	0.0009	0.006	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	<0.01	0.005	0.01	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	<0.06	0.03	0.06	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	<0.0075	0.0040	0.0075	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	<0.004	0.002	0.004	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	<0.01	0.002	0.01	W109280	01-Mar-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	<0.100	0.034	0.100	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO ₄	mg/L Extract	0.34	0.05	0.30	W109244	01-Mar-11	B7

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
--------	---------	-------	------------	----------	--------	-------------------	----------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	mg/kg	119	100	119	80 - 120	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	110	100	110	80 - 120	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	113	100	113	80 - 120	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	115	100	115	80 - 120	W109096	03-Mar-11	
EPA 6010B	Iron	mg/kg	1110	1000	111	80 - 120	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	110	100	110	80 - 120	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	117	100	117	80 - 120	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	101	100	101	80 - 120	W109096	03-Mar-11	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ANP	TCaCO ₃ /kT	25.6	24.9	103	80 - 120	W109181	25-Feb-11	
Modified Sobek	Total Sulfur	%	3.39	3.21	106	80 - 120	W109181	23-Feb-11	

Classical Chemistry Parameters

ASA 9	Paste pH	pH Units	6.36	6.36	100	80 - 120	W109306	28-Feb-11	
-------	----------	----------	------	------	-----	----------	---------	-----------	--



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
SPLP Leachates (Metals)									
EPA 6010B	Aluminum	mg/L Extract	1.0	1.00	102	80 - 120	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	1.02	1.00	102	80 - 120	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.06	1.00	106	80 - 120	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.0	10.0	99.8	80 - 120	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.02	1.00	102	80 - 120	W109280	01-Mar-11	
SPLP Leachates (Anions)									
EPA 300.0	Fluoride	mg/L Extract	2.02	2.00	101	90 - 110	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO ₄	mg/L Extract	10.1	10.0	101	90 - 110	W109244	01-Mar-11	B7

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Acid/Base Accounting & Sulfur Forms									
Modified Sobek	ANP	TCaCO ₃ /kT	11.8	11.3	4.6	20	W109181	25-Feb-11	
Modified Sobek	Non-Sulfate Sulfur	%	0.01	0.01	34.0	20	W109181	24-Feb-11	R2
Modified Sobek	Total Sulfur	%	0.03	0.03	12.5	20	W109181	23-Feb-11	
Modified Sobek	Non-extractable Sulfur	%	<0.01	<0.01	<RL	20	W109181	24-Feb-11	
Classical Chemistry Parameters									
ASA 9	Paste pH	pH Units	7.09	7.17	1.1	20	W109306	28-Feb-11	
ASA 9	Paste pH	pH Units	7.65	7.62	0.4	20	W109306	28-Feb-11	
SPLP Leachates (Classical)									
SM 2540 C	Total Diss. Solids	mg/L Extract	150	154	2.6	5	W109241	25-Feb-11	
SM 4500 H B	pH	pH Units	4.32	4.35	0.7	20	W109250	24-Feb-11	
SPLP Leachates (Anions)									
EPA 300.0	Fluoride	mg/L Extract	0.244	0.263	7.6	20	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO ₄	mg/L Extract	110	111	1.3	20	W109244	01-Mar-11	B7,D2

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Aluminum	mg/kg	17100	11800	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Cadmium	mg/kg	123	44.3	100	78.9	75 - 125	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	123	18.4	100	105	75 - 125	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	991	989	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Iron	mg/kg	39500	36600	1000	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Lead	mg/kg	2110	1560	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Manganese	mg/kg	3050	3930	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Zinc	mg/kg	6020	12000	100	R > 4S	75 - 125	W109096	03-Mar-11	D2,M3
SPLP Leachates (Metals)										
EPA 6010B	Aluminum	mg/L Extract	1.1	<0.08	1.00	106	75 - 125	W109280	01-Mar-11	



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Quality Control - MATRIX SPIKE Data (Continued)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
SPLP Leachates (Metals) (Continued)										
EPA 6010B	Cadmium	mg/L Extract	1.02	0.018	1.00	99.9	75 - 125	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	0.99	<0.006	1.00	98.9	75 - 125	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.07	<0.01	1.00	106	75 - 125	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.3	<0.06	10.0	103	75 - 125	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.01	<0.0075	1.00	101	75 - 125	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	2.09	1.05	1.00	104	75 - 125	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.63	0.59	1.00	104	75 - 125	W109280	01-Mar-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	2.32	0.263	2.00	103	90 - 110	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L Extract	120	111	10.0	R > 4S	90 - 110	W109244	01-Mar-11	B7,D2,M3

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Aluminum	mg/kg	18500	17100	100	8.3	20	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	125	123	100	1.6	20	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	127	123	100	2.9	20	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	1260	991	100	24.3	20	W109096	03-Mar-11	R1
EPA 6010B	Iron	mg/kg	38700	39500	1000	2.2	20	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	2330	2110	100	9.8	20	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	3090	3050	100	1.2	20	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	6610	6020	100	9.4	20	W109096	03-Mar-11	D2

SPLP Leachates (Metals)

EPA 6010B	Aluminum	mg/L Extract	1.0	1.1	1.00	1.9	20	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	1.04	1.02	1.00	1.8	20	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	1.00	0.99	1.00	1.5	20	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.09	1.07	1.00	2.1	20	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.1	10.3	10.0	2.2	20	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.03	1.01	1.00	2.1	20	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	2.14	2.09	1.00	2.0	20	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.67	1.63	1.00	2.2	20	W109280	01-Mar-11	



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0343
Reported: 04-Mar-11 08:47

Notes and Definitions

B7	Target analyte in method blank exceeded method QC limits, but concentrations in samples were at least 10x the blank concentration.
D2	Sample required dilution due to high concentration of target analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
R1	RPD exceeded the method acceptance limit.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable



CHAIN OF CUSTODY RECORD

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

Page 1 of 1

FOR SVL USE ONLY
SVL JOB #

TEMP on Receipt:

W1B0343

Table 1. -- Matrix Type

1 - Surface Water, 2 - Ground Water
3 - Soil/Sediment, 4 - Rinsate, 5 - Oil
6 - Waste, 7 - Other

Report to Company: **FMI/Golder**

Contact: **Pam Pinson/Jen Pepe (Electronic Only)**

Address: **PO Box 10**

Bayard, NM 88023

Phone Number: **575-912-5213 (Jen 575-388-0118)**

FAX Number

E-mail: **pamela_pinson@fmi.com/jpepe@golder.com**

Invoice Sent To: **Chino Mines Company**

Contact: **Pam Pinson**

Address: **PO Box 10**

Bayard, NM 88023

Phone Number: **575-912-5213**

FAX Number


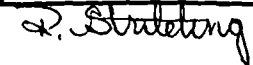
PO# **ZN01JG-001**

Project Name: **Groundhog Mine - Pipeline Removal**

Sampler's Signature:

Indicate State of sample origination: **NM** USACE? ☐ Yes ☒ No

Sample ID	Collection	Misc	Preservative(s)	Analyses Required				Rush Instructions (Days)	Comments							
				Paste pH (ASA 9)	ABA (Modified Sobek)	SPLP (1312)	Total Metals (SW-846 Method 3050)									
Please take care to distinguish between: 1 and I 2 and Z 5 and S Ø and O Thanks!																
Date	Time	Collected by: (init.)	Matrix Type (From Table 1)	No. of Containers	Unpreserved	HNO ₃ Filtered	HNO ₃ Unfiltered	HCl	H ₂ SO ₄	NaOH	Other (Specify)	Paste pH (ASA 9)	ABA (Modified Sobek)	SPLP (1312)	Total Metals (SW-846 Method 3050)	
1	PC-Tqm-1	2/16/11 11:15 jp	3	x								x	x	x	x	Prep Samples: Crush to 3/8-inch for SPLP, then pulverized to -160 mesh for ABA and Total Metals. Samples PC-Tqm-1 and PC-Tqm-2 need individual paste pH, and then should be composited for ABA, SPLP, Total Metals, and a paste pH on the composite. All other samples will be run individually for all analyses. SPLP: pH, Al, Cd, Co, Cu, Fe, Mn, Pb, Zn, TDS, F, SO ₄ . Detection limits should be less than NM Groundwater Standards. Total metals: Al, Cd, Co, Cu, Fe, Pb, Mn, Zn
2	PC-Tqm-2	2/16/11 11:40 jp	3	x								x	x	x	x	
3	PC-Poswado-3	2/16/11 11:50 jp	3	x								x	x	x	x	
4	PC-Qal-4	2/16/11 12:15 jp	3	x								x	x	x	x	
5																
6																
7																
8																
9																
10																

Relinquished by:  Date: 2/17/11 Time: 11:45
Received by:  Date: 2/18/11 Time: 10:59

* Sample Reject ☐ Return ☐ Dispose ☐ Store (30 Days)

White LAB COPY Yellow CUSTOMER COPY

SVL-COC'S



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
PC-Tgr-5	W1B0344-01	Soil	16-Feb-11 12:20	JP	18-Feb-2011
PC-Tgr-6	W1B0344-02	Soil	16-Feb-11 12:30	JP	18-Feb-2011
PC-Tgr-DUP	W1B0344-03	Soil	16-Feb-11 12:10	JP	18-Feb-2011

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Sample preparation is defined by the client as per their Data Quality Objectives.

This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.

The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

(Q6) SVL received the following containers outside of published EPA guidelines for preservation temperatures (0-6°C).

The guidelines do not pertain to nitric-preserved metals.

Default Cooler (Received Temperature: 8.8°C)

<u>Labnumber</u>	<u>Container</u>	<u>Client ID</u>	<u>Labnumber</u>	<u>Container</u>	<u>Client ID</u>
W1B0344-01 A	Bag, Ziploc	PC-Tgr-5	W1B0344-01 B	Manilla Pulverize	PC-Tgr-5
W1B0344-02 A	Bag, Ziploc	PC-Tgr-6	W1B0344-02 B	Manilla Pulverize	PC-Tgr-6
W1B0344-03 A	Bag, Ziploc	PC-Tgr-DUP	W1B0344-03 B	Manilla Pulverize	PC-Tgr-DUP



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Client Sample ID: PC-Tgr-5

SVL Sample ID: W1B0344-01 (Soil)

Sample Report Page 1 of 1

Sampled: 16-Feb-11 12:20
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	32000	mg/kg	8.0	2.0		W109096	AS	03/03/11 11:13	
EPA 6010B	Cadmium	3.94	mg/kg	0.20	0.03		W109096	AS	03/03/11 11:15	
EPA 6010B	Cobalt	8.46	mg/kg	0.60	0.06		W109096	AS	03/03/11 11:15	
EPA 6010B	Copper	664	mg/kg	1.00	0.21		W109096	AS	03/03/11 11:15	
EPA 6010B	Iron	31600	mg/kg	6.0	1.5		W109096	AS	03/03/11 11:13	
EPA 6010B	Lead	552	mg/kg	0.75	0.36		W109096	AS	03/03/11 11:15	
EPA 6010B	Manganese	3150	mg/kg	0.40	0.09		W109096	AS	03/03/11 11:13	
EPA 6010B	Zinc	3470	mg/kg	1.00	0.14		W109096	DG	03/03/11 15:21	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	-0.7	TCaCO3/kT	0.3			N/A		02/25/11 14:34	
Modified Sobek	AGP	0.7	TCaCO3/kT	0.3			N/A		02/24/11 16:00	
Modified Sobek	ANP	< 0.3	TCaCO3/kT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01			W109181	HJG	02/24/11 16:00	
Modified Sobek	Non-Sulfate Sulfur	0.02	%	0.01			W109181	HJG	02/24/11 15:02	
Modified Sobek	Pyritic Sulfur	0.02	%	0.01			N/A		02/24/11 16:00	
Modified Sobek	Sulfate Sulfur	0.68	%	0.01			N/A		02/24/11 15:02	
Modified Sobek	Total Sulfur	0.71	%	0.01			W109181	HJG	02/23/11 14:26	

Classical Chemistry Parameters

ASA 9	Paste pH @19.6°C	3.76	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	88.1	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	4.38	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	24.0	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 17:53	
EPA 6010B	Cadmium	0.157	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 17:54	
EPA 6010B	Cobalt	0.18	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 17:55	
EPA 6010B	Copper	12.3	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 17:54	
EPA 6010B	Iron	< 0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 17:53	
EPA 6010B	Lead	0.267	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 17:55	
EPA 6010B	Manganese	45.9	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 17:53	
EPA 6010B	Zinc	89.3	mg/L Extract	0.10	0.02	10	W109280	AS	03/01/11 18:28	D2

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	1330	mg/L Extract	10.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.8°C	4.35	pH Units				W109250	DKS	02/24/11 12:10	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	1.39	mg/L Extract	0.100	0.034		W109244	FEH	03/01/11 20:14	
EPA 300.0	Sulfate as SO4	1170	mg/L Extract	7.50	1.32	25	W109244	FEH	03/01/11 20:26	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Client Sample ID: PC-Tgr-6

SVL Sample ID: W1B0344-02 (Soil)

Sample Report Page 1 of 1

Sampled: 16-Feb-11 12:30
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	19200	mg/kg	8.0	2.0		W109096	AS	03/03/11 11:19	
EPA 6010B	Cadmium	1.14	mg/kg	0.20	0.03		W109096	AS	03/03/11 11:21	
EPA 6010B	Cobalt	10.2	mg/kg	0.60	0.06		W109096	AS	03/03/11 11:21	
EPA 6010B	Copper	408	mg/kg	1.00	0.21		W109096	AS	03/03/11 11:21	
EPA 6010B	Iron	26100	mg/kg	6.0	1.5		W109096	AS	03/03/11 11:19	
EPA 6010B	Lead	635	mg/kg	0.75	0.36		W109096	AS	03/03/11 11:21	
EPA-6010B	Manganese	3240	mg/kg	0.40	0.09		W109096	AS	03/03/11 11:19	
EPA 6010B	Zinc	1520	mg/kg	1.00	0.14		W109096	DG	03/03/11 15:27	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	5.1	TCaCO3/KT	0.3			N/A		02/25/11 14:34	
Modified Sobek	AGP	0.3	TCaCO3/KT	0.3			N/A		02/24/11 16:03	
Modified Sobek	ANP	5.4	TCaCO3/KT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01			W109181	HJG	02/24/11 16:03	
Modified Sobek	Non-Sulfate Sulfur	0.01	%	0.01			W109181	HJG	02/24/11 15:04	
Modified Sobek	Pyritic Sulfur	0.01	%	0.01			N/A		02/24/11 16:03	
Modified Sobek	Sulfate Sulfur	0.13	%	0.01			N/A		02/24/11 15:04	
Modified Sobek	Total Sulfur	0.14	%	0.01			W109181	HJG	02/23/11 14:35	

Classical Chemistry Parameters

ASA 9	Paste pH @19.3°C	3.97	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	97.8	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	4.81	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	0.6	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 17:59	
EPA 6010B	Cadmium	0.020	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 18:00	
EPA 6010B	Cobalt	0.03	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 18:00	
EPA 6010B	Copper	3.97	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 18:00	
EPA 6010B	Iron	< 0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 17:59	
EPA 6010B	Lead	0.0247	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 18:00	
EPA 6010B	Manganese	4.46	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 17:59	
EPA 6010B	Zinc	9.27	mg/L Extract	0.01	0.002		W109280	AS	03/01/11 18:00	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	153	mg/L Extract	10.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.8°C	4.86	pH Units				W109250	DKS	02/24/11 12:12	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	0.263	mg/L Extract	0.100	0.034		W109244	FEH	03/01/11 20:38	
EPA 300.0	Sulfate as SO4	111	mg/L Extract	1.50	0.26	5	W109244	FEH	03/01/11 20:50	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Client Sample ID: PC-Tgr-DUP

SVL Sample ID: W1B0344-03 (Soil)

Sample Report Page 1 of 1

Sampled: 16-Feb-11 12:10
Received: 18-Feb-11
Sampled By: JP

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
--------	---------	--------	-------	----	-----	----------	-------	---------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	29900	mg/kg	8.0	2.0		W109096	AS	03/03/11 11:25	
EPA 6010B	Cadmium	2.88	mg/kg	0.20	0.03		W109096	AS	03/03/11 11:27	
EPA 6010B	Cobalt	8.41	mg/kg	0.60	0.06		W109096	AS	03/03/11 11:27	
EPA 6010B	Copper	520	mg/kg	1.00	0.21		W109096	AS	03/03/11 11:27	
EPA 6010B	Iron	28700	mg/kg	6.0	1.5		W109096	AS	03/03/11 11:25	
EPA 6010B	Lead	242	mg/kg	0.75	0.36		W109096	AS	03/03/11 11:27	
EPA 6010B	Manganese	3480	mg/kg	0.40	0.09		W109096	AS	03/03/11 11:25	
EPA 6010B	Zinc	2630	mg/kg	1.00	0.14		W109096	DG	03/03/11 15:32	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ABA	< 0.3	TCaCO ₃ /kT	0.3			N/A		02/25/11 14:34	
Modified Sobek	AGP	< 0.3	TCaCO ₃ /kT	0.3			N/A		02/24/11 16:06	
Modified Sobek	ANP	< 0.3	TCaCO ₃ /kT	0.3	0.01		W109181	HJG	02/25/11 14:34	
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01			W109181	HJG	02/24/11 16:06	
Modified Sobek	Non-Sulfate Sulfur	< 0.01	%	0.01			W109181	HJG	02/24/11 15:13	
Modified Sobek	Pyritic Sulfur	< 0.01	%	0.01			N/A		02/24/11 16:06	
Modified Sobek	Sulfate Sulfur	0.59	%	0.01			N/A		02/24/11 15:13	
Modified Sobek	Total Sulfur	0.59	%	0.01			W109181	HJG	02/23/11 14:38	

Classical Chemistry Parameters

ASA 9	Paste pH @19.7°C	3.69	pH Units				W109306	HJG	02/28/11 10:44	
-------	------------------	------	----------	--	--	--	---------	-----	----------------	--

Percent Solids

Percent Solids	% Solids	89.7	%	0.1			W109098	DP	02/23/11 09:57	
----------------	----------	------	---	-----	--	--	---------	----	----------------	--

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	4.10	pH Units				W109037	ESB	02/23/11 08:30	
-------------	----------------	------	----------	--	--	--	---------	-----	----------------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	20.5	mg/L Extract	0.08	0.02		W109280	AS	03/01/11 18:22	
EPA 6010B	Cadmium	0.118	mg/L Extract	0.002	0.0005		W109280	AS	03/01/11 18:23	
EPA 6010B	Cobalt	0.14	mg/L Extract	0.006	0.0009		W109280	AS	03/01/11 18:23	
EPA 6010B	Copper	9.69	mg/L Extract	0.01	0.005		W109280	AS	03/01/11 18:23	
EPA 6010B	Iron	0.06	mg/L Extract	0.06	0.03		W109280	AS	03/01/11 18:22	
EPA 6010B	Lead	0.0501	mg/L Extract	0.0075	0.0040		W109280	AS	03/01/11 18:23	
EPA 6010B	Manganese	35.1	mg/L Extract	0.004	0.002		W109280	AS	03/01/11 18:22	
EPA 6010B	Zinc	60.4	mg/L Extract	0.01	0.002		W109280	AS	03/01/11 18:23	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	960	mg/L Extract	10.0			W109241	JMS	02/25/11 11:19	
SM 4500 H B	pH @21.8°C	4.03	pH Units				W109250	DKS	02/24/11 12:14	H5

SPLP Leachates (Anions)

EPA 300.0	Fluoride	1.14	mg/L Extract	0.100	0.034		W109244	FEH	03/01/11 22:15	
EPA 300.0	Sulfate as SO ₄	671	mg/L Extract	7.50	1.32	25	W109244	FEH	03/01/11 22:27	B7,D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
--------	---------	-------	--------	-----	-----	----------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	mg/kg	<8.0	2.0	8.0	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	<0.20	0.03	0.20	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	<0.60	0.06	0.60	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	<1.00	0.21	1.00	W109096	03-Mar-11	B7
EPA 6010B	Iron	mg/kg	<6.0	1.5	6.0	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	<0.75	0.36	0.75	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	<0.40	0.09	0.40	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	<1.00	0.14	1.00	W109096	03-Mar-11	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ANP	TCaCO3/kT	<0.3	0.01	0.3	W109181	25-Feb-11	
Modified Sobek	Non-Sulfate Sulfur	%	<0.01		0.01	W109181	24-Feb-11	
Modified Sobek	Total Sulfur	%	<0.01		0.01	W109181	23-Feb-11	
Modified Sobek	Non-extractable Sulfur	%	<0.01		0.01	W109181	24-Feb-11	

SPLP Extraction Parameters

SW-846 1312	Final Fluid pH	pH Units	5.00			W109037	23-Feb-11	
-------------	----------------	----------	------	--	--	---------	-----------	--

SPLP Leachates (Metals)

EPA 6010B	Aluminum	mg/L Extract	<0.08	0.02	0.08	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	<0.002	0.0005	0.002	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	<0.006	0.0009	0.006	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	<0.01	0.005	0.01	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	<0.06	0.03	0.06	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	<0.0075	0.0040	0.0075	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	<0.004	0.002	0.004	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	<0.01	0.002	0.01	W109280	01-Mar-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	<0.100	0.034	0.100	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L Extract	0.34	0.05	0.30	W109244	01-Mar-11	B7

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
--------	---------	-------	------------	----------	--------	-------------------	----------	----------	-------

Metals (Total) by EPA 6000/7000 Methods

EPA 6010B	Aluminum	mg/kg	119	100	119	80 - 120	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	110	100	110	80 - 120	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	113	100	113	80 - 120	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	115	100	115	80 - 120	W109096	03-Mar-11	
EPA 6010B	Iron	mg/kg	1110	1000	111	80 - 120	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	110	100	110	80 - 120	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	117	100	117	80 - 120	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	101	100	101	80 - 120	W109096	03-Mar-11	

Acid/Base Accounting & Sulfur Forms

Modified Sobek	ANP	TCaCO3/kT	25.6	24.9	103	80 - 120	W109181	25-Feb-11	
Modified Sobek	Total Sulfur	%	3.39	3.21	106	80 - 120	W109181	23-Feb-11	

Classical Chemistry Parameters

ASA 9	Paste pH	pH Units	6.36	6.36	100	80 - 120	W109306	28-Feb-11	
-------	----------	----------	------	------	-----	----------	---------	-----------	--



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
SPLP Leachates (Metals)									
EPA 6010B	Aluminum	mg/L Extract	1.0	1.00	102	80 - 120	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	1.02	1.00	102	80 - 120	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.06	1.00	106	80 - 120	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.0	10.0	99.8	80 - 120	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	1.03	1.00	103	80 - 120	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.02	1.00	102	80 - 120	W109280	01-Mar-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	2.02	2.00	101	90 - 110	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L Extract	10.1	10.0	101	90 - 110	W109244	01-Mar-11	B7

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Acid/Base Accounting & Sulfur Forms									
Modified Sobek	ANP	TCaCO3/kT	11.8	11.3	4.6	20	W109181	25-Feb-11	
Modified Sobek	Non-Sulfate Sulfur	%	0.01	0.01	34.0	20	W109181	24-Feb-11	R2
Modified Sobek	Total Sulfur	%	0.03	0.03	12.5	20	W109181	23-Feb-11	
Modified Sobek	Non-extractable Sulfur	%	<0.01	<0.01	<RL	20	W109181	24-Feb-11	

Classical Chemistry Parameters

ASA 9	Paste pH	pH Units	7.09	7.17	1.1	20	W109306	28-Feb-11	
ASA 9	Paste pH	pH Units	7.65	7.62	0.4	20	W109306	28-Feb-11	

SPLP Leachates (Classical)

SM 2540 C	Total Diss. Solids	mg/L Extract	150	154	2.6	5	W109241	25-Feb-11	
SM 4500 H B	pH	pH Units	4.32	4.35	0.7	20	W109250	24-Feb-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	0.244	0.263	7.6	20	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L Extract	110	111	1.3	20	W109244	01-Mar-11	B7,D2

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Aluminum	mg/kg	17100	11800	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Cadmium	mg/kg	123	44.3	100	78.9	75 - 125	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	123	18.4	100	105	75 - 125	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	991	989	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Iron	mg/kg	39500	36600	1000	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Lead	mg/kg	2110	1560	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Manganese	mg/kg	3050	3930	100	R > 4S	75 - 125	W109096	03-Mar-11	M3
EPA 6010B	Zinc	mg/kg	6020	12000	100	R > 4S	75 - 125	W109096	03-Mar-11	D2,M3

SPLP Leachates (Metals)

EPA 6010B	Aluminum	mg/L Extract	1.1	<0.08	1.00	106	75 - 125	W109280	01-Mar-11	
-----------	----------	--------------	-----	-------	------	-----	----------	---------	-----------	--

SVL holds the following certifications: AZ:0538, CA:2080, CO:ID00019, FL(NELAC):E87993, ID:ID00019 & ID00965 (Microbiology), NV:ID000192007A, WA:1268, WY:ID00019



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: **W1B0344**
Reported: 04-Mar-11 08:45

Quality Control - MATRIX SPIKE Data (Continued)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
SPLP Leachates (Metals) (Continued)										
EPA 6010B	Cadmium	mg/L Extract	1.02	0.018	1.00	99.9	75 - 125	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	0.99	<0.006	1.00	98.9	75 - 125	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.07	<0.01	1.00	106	75 - 125	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.3	<0.06	10.0	103	75 - 125	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.01	<0.0075	1.00	101	75 - 125	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	2.09	1.05	1.00	104	75 - 125	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.63	0.59	1.00	104	75 - 125	W109280	01-Mar-11	

SPLP Leachates (Anions)

EPA 300.0	Fluoride	mg/L Extract	2.32	0.263	2.00	103	90 - 110	W109244	01-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L Extract	120	111	10.0	R > 4S	90 - 110	W109244	01-Mar-11	B7,D2,M3

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total) by EPA 6000/7000 Methods										
EPA 6010B	Aluminum	mg/kg	18500	17100	100	8.3	20	W109096	03-Mar-11	
EPA 6010B	Cadmium	mg/kg	125	123	100	1.6	20	W109096	03-Mar-11	
EPA 6010B	Cobalt	mg/kg	127	123	100	2.9	20	W109096	03-Mar-11	
EPA 6010B	Copper	mg/kg	1260	991	100	24.3	20	W109096	03-Mar-11	R1
EPA 6010B	Iron	mg/kg	38700	39500	1000	2.2	20	W109096	03-Mar-11	
EPA 6010B	Lead	mg/kg	2330	2110	100	9.8	20	W109096	03-Mar-11	
EPA 6010B	Manganese	mg/kg	3090	3050	100	1.2	20	W109096	03-Mar-11	
EPA 6010B	Zinc	mg/kg	6610	6020	100	9.4	20	W109096	03-Mar-11	D2

SPLP Leachates (Metals)

EPA 6010B	Aluminum	mg/L Extract	1.0	1.1	1.00	1.9	20	W109280	01-Mar-11	
EPA 6010B	Cadmium	mg/L Extract	1.04	1.02	1.00	1.8	20	W109280	01-Mar-11	
EPA 6010B	Cobalt	mg/L Extract	1.00	0.99	1.00	1.5	20	W109280	01-Mar-11	
EPA 6010B	Copper	mg/L Extract	1.09	1.07	1.00	2.1	20	W109280	01-Mar-11	
EPA 6010B	Iron	mg/L Extract	10.1	10.3	10.0	2.2	20	W109280	01-Mar-11	
EPA 6010B	Lead	mg/L Extract	1.03	1.01	1.00	2.1	20	W109280	01-Mar-11	
EPA 6010B	Manganese	mg/L Extract	2.14	2.09	1.00	2.0	20	W109280	01-Mar-11	
EPA 6010B	Zinc	mg/L Extract	1.67	1.63	1.00	2.2	20	W109280	01-Mar-11	



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Chino Mines
PO Box 10
Bayard, NM 88023

Project Name: Groundhog soil
Work Order: W1B0344
Reported: 04-Mar-11 08:45

Notes and Definitions

B7	Target analyte in method blank exceeded method QC limits, but concentrations in samples were at least 10x the blank concentration.
D2	Sample required dilution due to high concentration of target analyte.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
R1	RPD exceeded the method acceptance limit.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

8.0



CHAIN OF CUSTODY RECORD

Page 1 of 1

SVL Analytical, Inc. • One Government Gulch • Kellogg, ID 83837 • (208) 784-1258 • FAX: (208) 783-0891

FOR SVL USE ONLY

SVL JOB #

TEMP on Receipt:

W180344

Table 1. -- Matrix Type

1 - Surface Water, 2 - Ground Water

3 - Soil/Sediment, 4 - Rinsate, 5 - Oil

6 - Waste, 7 - Other

Report to Company: FMI/GolderContact: Pam Pinson/Jen Pepe (Electronic Only)Address: PO Box 10Bayard, NM 88023Phone Number: 575-912-5213 (Jen 575-388-0118)

FAX Number: _____

E-mail: pamela_pinson@fmi.com/jpepe@golder.comInvoice Sent To: Chino Mines CompanyContact: Pam PinsonAddress: PO Box 10Bayard, NM 88023Phone Number: 575-912-5213

FAX Number: _____

PO# ZN01JG-001Project Name: Groundhog Mine - Pipeline Removal

Sampler's Signature: _____

Indicate State of sample origination: NMUSACE? ☐ Yes ☒ No

Analyses Required

Comments

Sample ID	Collection		Misc	Preservative(s)		Analyses Required				Rush Instructions (Days)	Comments								
	Date	Time		Collected by (Unit)	Matrix Type (From Table 1)	No. of Containers	Unpreserved	HNO ₃ Filtered	HNO ₃ Unfiltered			HCl	H ₂ SO ₄	NaOH	Other (Specify)	Paste pH (ASA 9)	ABA (Modified Sobek)	SPLP (1312)	Total Metals (SW-846 Method 3050)
1	PC-Tgr-5	2/16/11	12:20 jp	3	x	x	x	x	x	x	x	x	x	x	x	x	x		
2	PC-Tgr-6	2/16/11	12:30 jp	3	x	x	x	x	x	x	x	x	x	x	x	x	x		
3	PC-Tgr-Dup	2/16/11	12:10 jp	3	x	x	x	x	x	x	x	x	x	x	x	x	x		
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished by: Jen Pepe Date: 2/17/11 Time: 11:45 Received by: R. Stabbing Date: 2/18/11 Time: 10:59

* Sample Reject

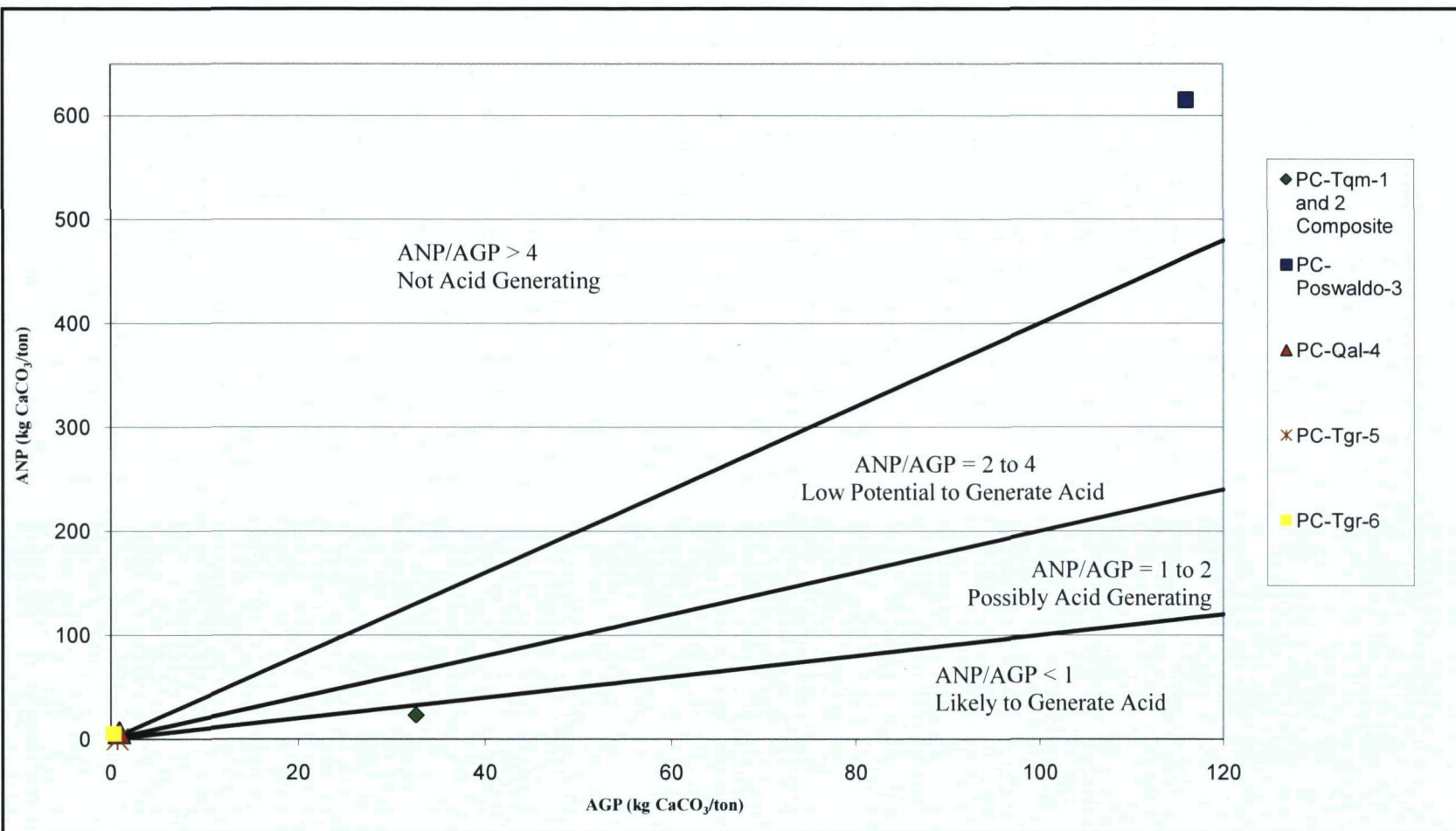
☐ Return☐ Dispose☐ Store (30 Days)

White LAB COPY

Yellow CUSTOMER COPY

SVL-COC

ATTACHMENT 3
ACID-BASE ACCOUNTING RESULTS
GRAPH SUMMARIES



Silver City, New Mexico

TITLE

Acid-Neutralization Potential (ANP) vs Acid-Generation Potential (AGP)

CLIENT/PROJECT

FREEPORT-MCMORAN CHINO MINES COMPANY
GROUNDHOG MINE PIPELINE REMOVAL SAMPLING

DRAWN

JP

DATE

8/11/11

JOB NO.

103-927041

CHECKED

DW

SCALE

REVIEWED

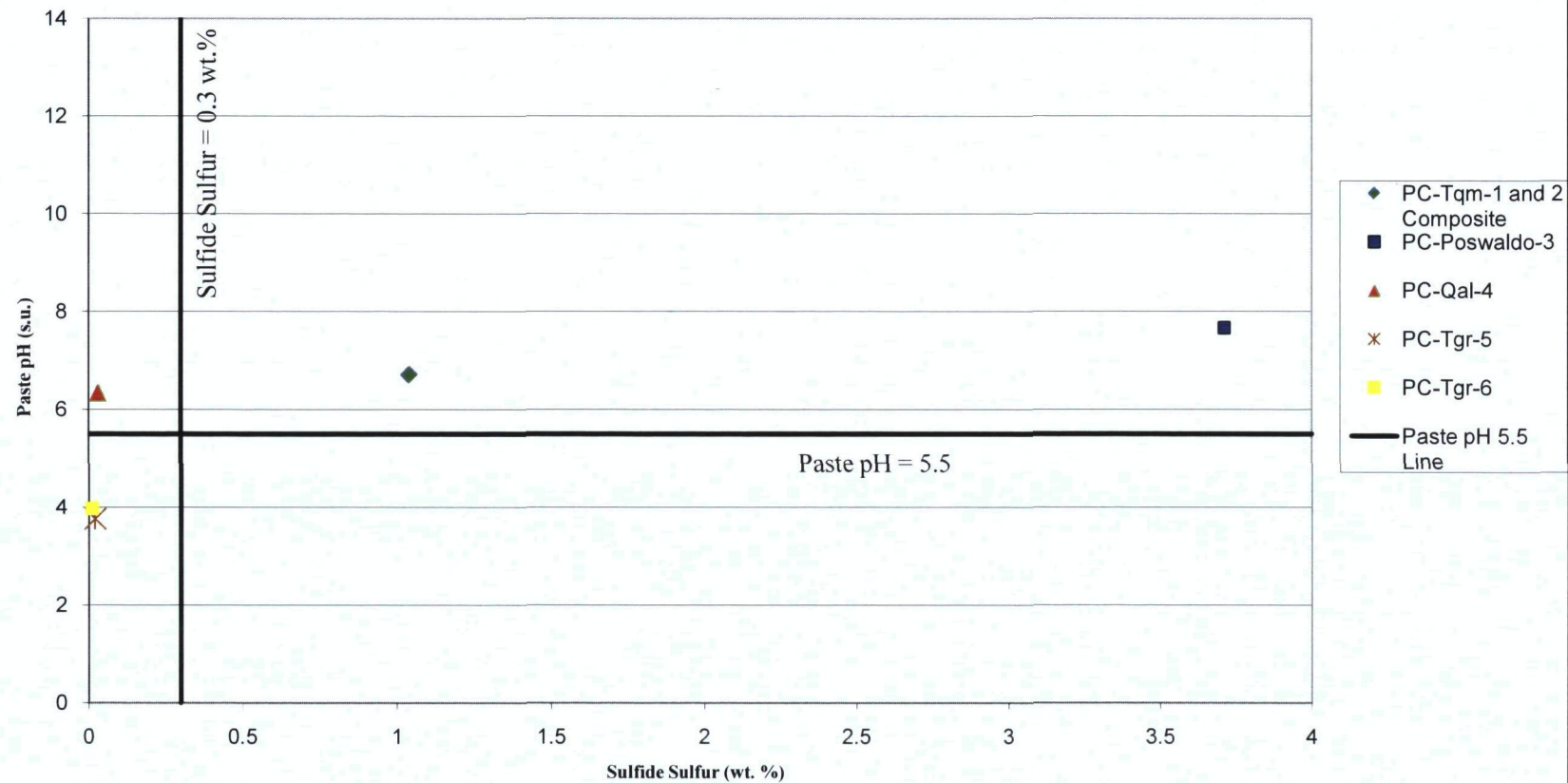
KJ

FILE NO.

DWG. NO.

FIGURE NO.

3-1



Silver City, New Mexico

CLIENT/PROJECT

FREEPORT-MCMORAN CHINO MINES COMPANY
GROUNDHOG MINE PIPELINE REMOVAL SAMPLING

TITLE

Paste pH vs Sulfide Sulfur

DRAWN

JP

DATE

8/11/11

JOB NO.

103-927041

CHECKED

DW

SCALE

DWG. NO.

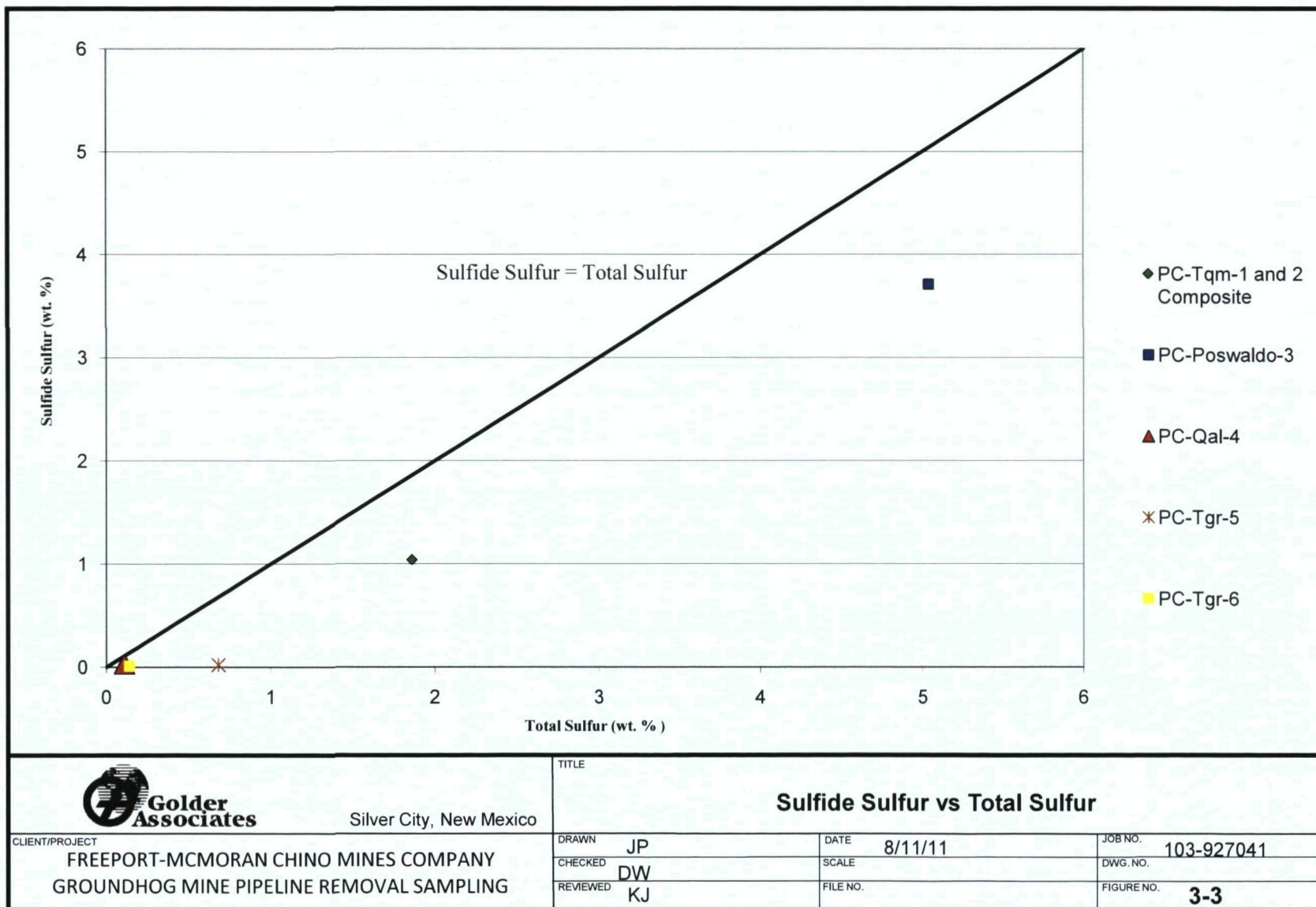
REVIEWED

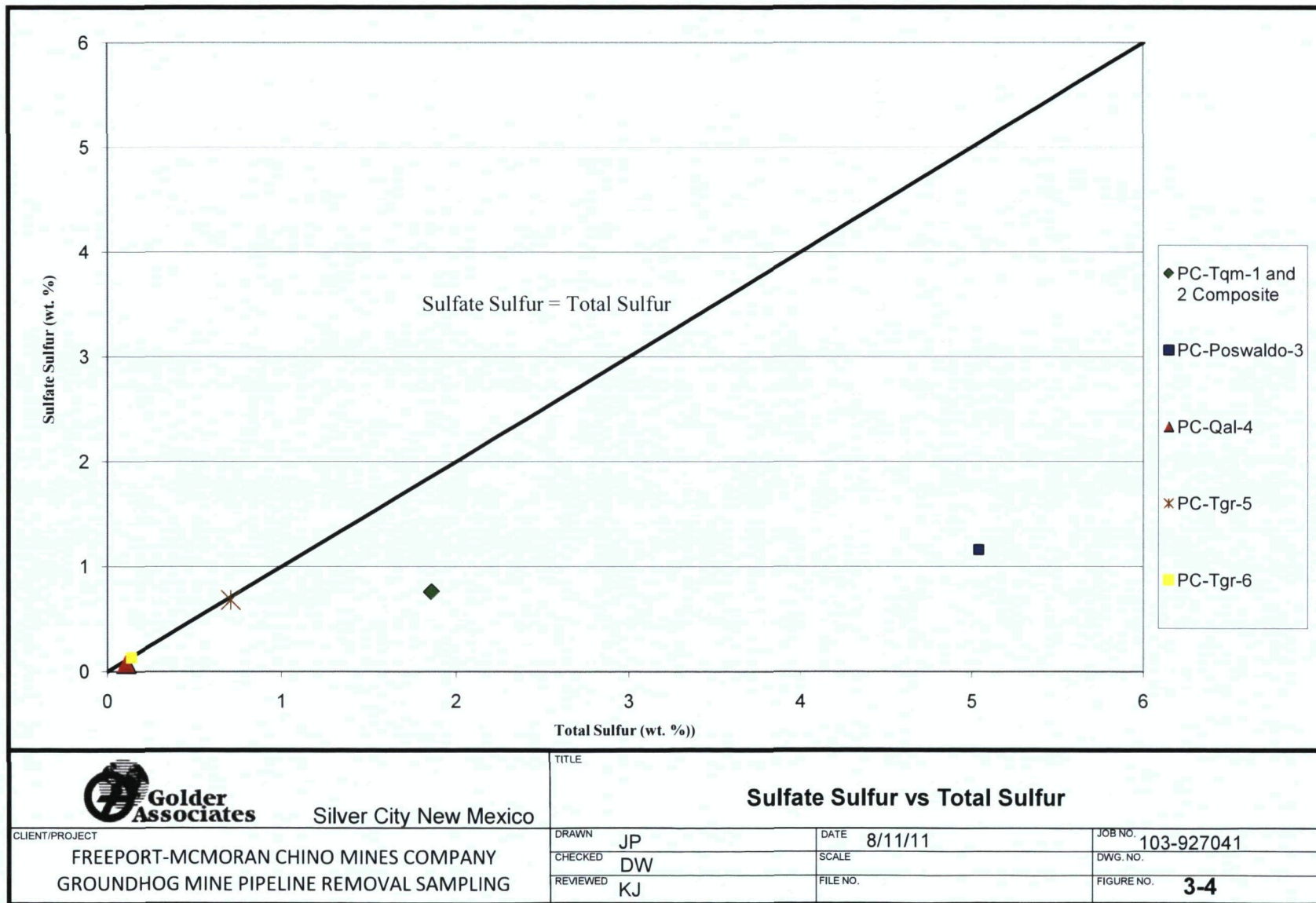
KJ

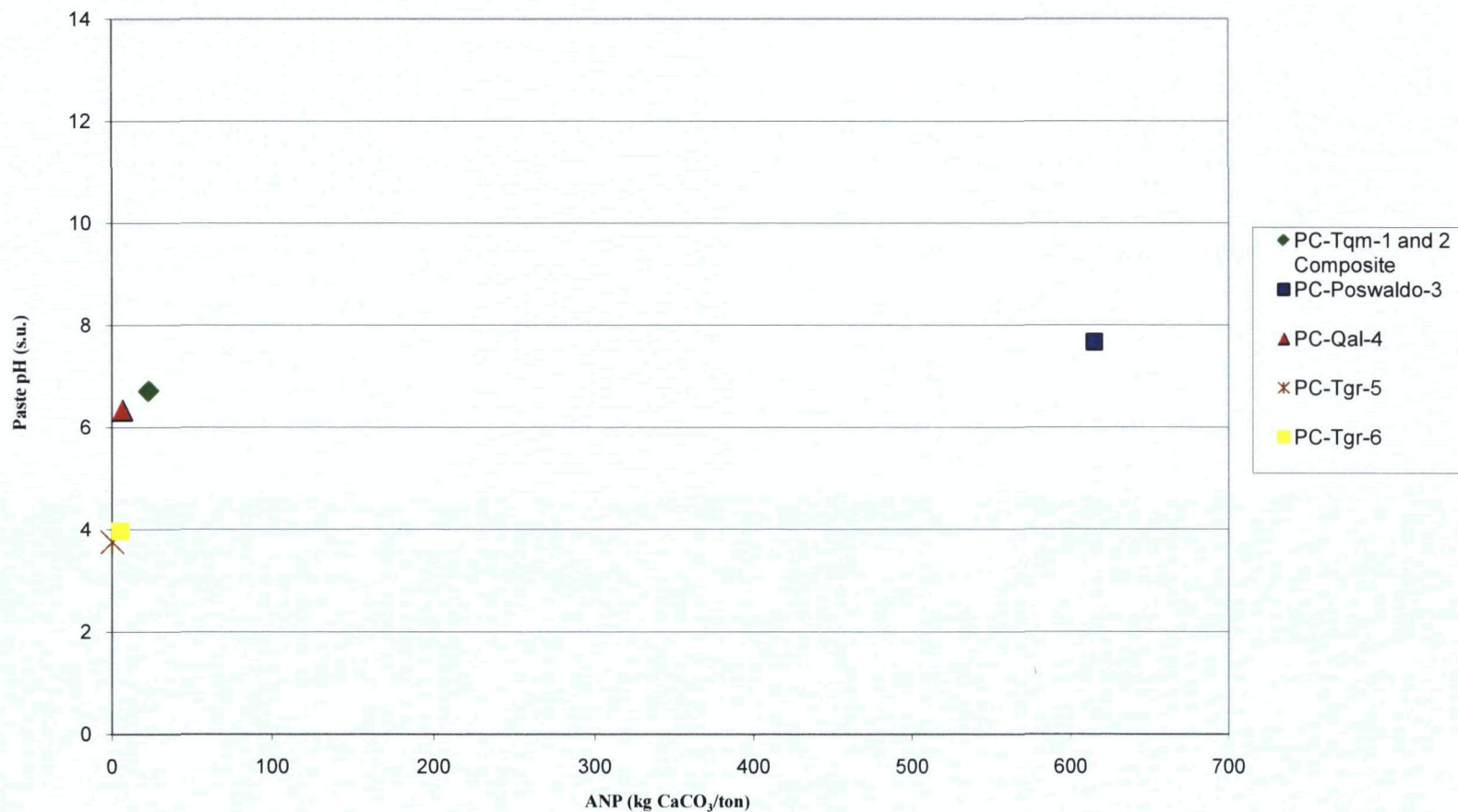
FILE NO.

FIGURE NO.

3-2







Silver City, New Mexico

TITLE

Paste pH vs Acid-Neutralization Potential (ANP)

CLIENT/PROJECT

FREEPORT-MCMORAN CHINO MINES COMPANY
GROUNDHOG MINE PIPELINE REMOVAL SAMPLING

DRAWN

JP

DATE

8/11/11

JOB NO.

103-927041

CHECKED

DW

SCALE

DWG. NO.

REVIEWED

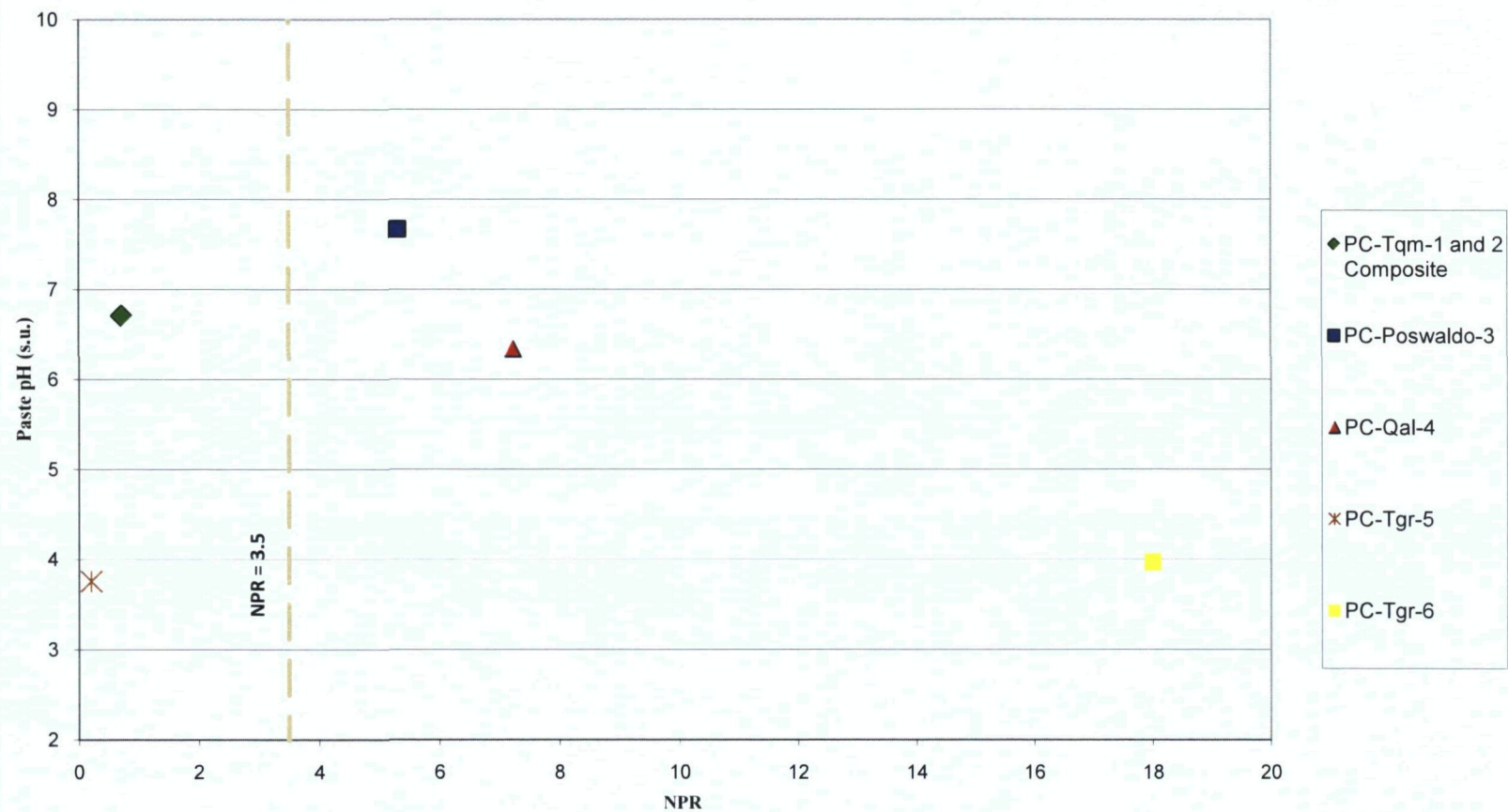
KJ

FILE NO.

FIGURE NO.

3-5

Golder Associates



Silver City, New Mexico

CLIENT/PROJECT

FREEPORT-MCMORAN CHINO MINES COMPANY
GROUNDHOG MINE PIPELINE REMOVAL SAMPLING

TITLE

Paste pH vs Neutralization Potential Ratio (NPR)

DRAWN JP
CHECKED DW
REVIEWED KJ

DATE 8/11/11
SCALE
FILE NO.

JOB NO. 103-927041
DWG. NO.
FIGURE NO. 3-6